CVARN-ROCK ART VIRTUAL CORPUS OF NORTH-WESTERN PORTUGAL. A MULTIMEDIA TOOL TO INVESTIGATE AND DESCRIBE POST-PALAEOLITHIC ROCK ART

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***Abstract**: The purpose of this paper is the dissemination of the Rock Art Virtual Corpus of the Northwest of Portugal (CVARN), a database dedicated to the theme of Post-Palaeolithic rock art in the Northwest of Portugal, which has been available online since the end of September 2014.*

This software tool is being built and developed under the ENARDAS project, a scientific project financed by the Thematic Factors of Competitiveness Operational Programme and by the European Regional Development Fund, and has been on-going since 2011, but is now open to the entire scientific community.

Apart from being a first compilation of different "styles" of rock arts that occur between the western façade of Iberia, between the basins of the Minho and Vouga rivers, it will have both social and scientific functions. In social terms, the results obtained may contribute to regional development, especially regarding development from the perspective of tourism. In scientific terms, it will allow us to promote scientific research in this field of knowledge and to enable scientifically validated arguments for the integration of rock art sites into tourism evaluation projects.

Keywords: *Open-air rock art repository, Disclosure tool, Knowledge tool.*

1. Introduction

The Rock Art Virtual Corpus of North-Western Portugal – CVARN - is a database dedicated to rock art. It was developed within the ENARDAS project (PTDC/HIS-ARQ/112983/2009) between April 2011 and May 2014 and was available online through a website (www.cvarn.org) from the end of October of 2014.

It corresponds to the need to have a repository with social and scientific functions, which integrates the geo-referenced data and a series of open-air rock art site-characterisations, which cover administrative information, physical context data, archaeological features, state of conservation, ethnographic data and others varieties of documentation associated with open-air rock art.

In addition to providing a model that allows the storage of data within the categories described above, it also contains an application that manages stored data, providing coherence and quality control. With this controlled data, the system also allows the realisation of a series of pre-defined queries that allows it to function as a tool for exploitation and research on the data set.

The information to feed this database came from bibliographic sources; from the systematic collection of information queries in the Endovélico database, an archaeological heritage management and information system pertaining to the General Direction of Cultural Heritage – DGPC, an institution that falls under the Ministry of Culture of Portugal (Bugalhão *et al.,* 2002); and also from archaeological field surveys, not only to relocate previously documented rock carvings, but also to discover new ones and describe occasional findings by amateurs.

Taking into account the different sources of information, there are some specific problems in the description of each site, such as the incomplete information about many of them, mainly in the Endovélico database, which will be resolved in the future, based on new projects that complete field work and new collaborations with the archaeological community and municipalities. In this sense, apart from being an initial compilation of different types of open-air rock art with systematic and scientifically validated information, it is also open to new data, and will remain a work in progress.

The objective of this article is to describe the features of this database and its possibilities as a tool of social and archaeological utility.

2. The database

CVARN is based on the implementation of a database in Microsoft Access format, where archaeological sites are stored as geo-referenced points. This database is organized in a series of tables that allow us to characterise each of the elements based on the different characteristics that need to be defined. The general structure of the model is presented in the following diagram (Fig. 1):

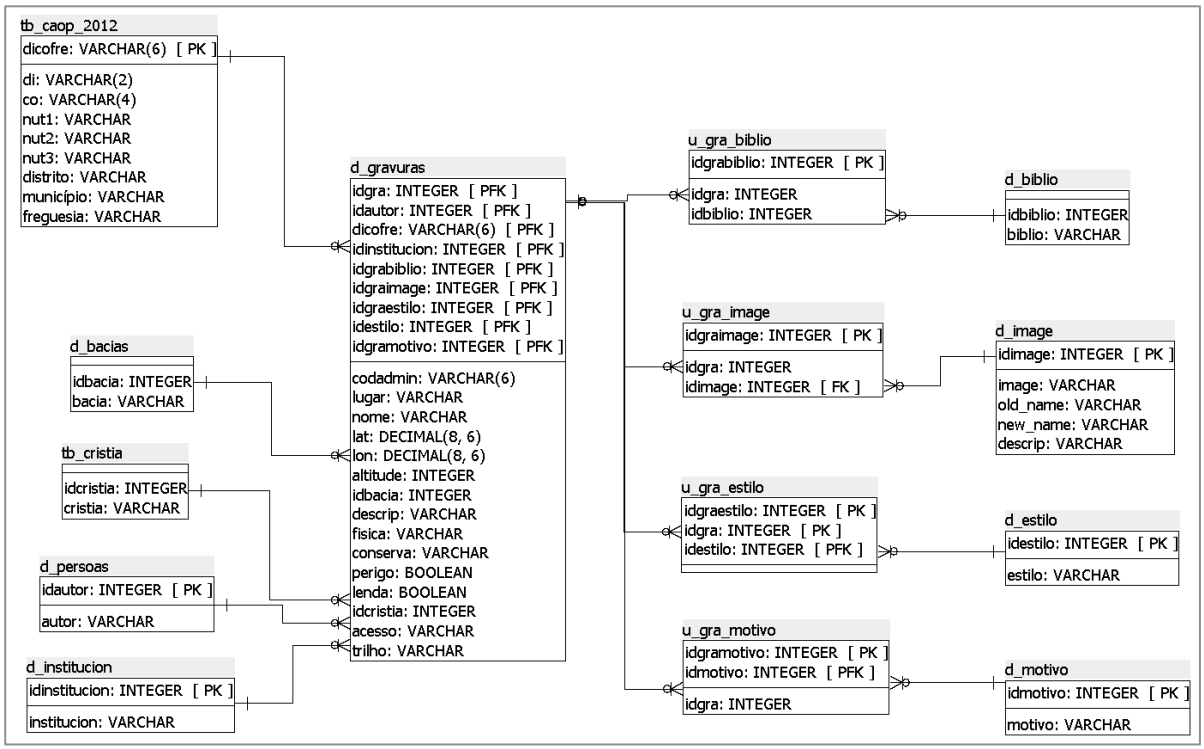

Fig. 1 - Implemented relational model for CVARN database.

The table **d_gravuras** (rock sites) is the main table of the model where the data that characterize each of the sites is stored. These are individualized by the creation of a unique identifier of site *idgra* and that works as the main index, besides the name by which each one of the engraving sites is recognised. In addition to these identification data a small description is also provided.

The location of the sites is given using the geographic coordinates of the sites in a geographic coordinate system and datum WGS84 in decimal annotation (EPSG: 4326) with longitude data *lon.* and latitude *lat.* This datum is the one used in the inventory of Endovélico and is also a universal system from which geographical projections of the coordinates can be made to any other system. This storage of coordinates meant the unification of the data of the engraving sites, since in many cases they were in different projections or annotations as sexagesimal coordinates. This unification of locations allows the treatment of data in a uniform way with any software that can handle geographic information.

The administrative location is given through the field *dicofre*.
It stores a six-digit alphanumeric code in which the first two digits refer to the district identifier, the next two to the municipality, and finally with a six-figure composition referring to the parish. This field depends on the relationship with the tabletb_caop_2012. CAOP is the official administrative letter of the Direção-Geral do Território (DGT) of Portugal, (General Directorate of the Territory) and the version used is the one corresponding to the official limits of 2012. The resulting table comes from a layer in shape-file format and has been used for the generation of project mapping. The current version corresponds to the administrative division of the year 2015 and is available on the DGT website[1].

The engraving sites are also identified by the geographical location characteristics, the description of the altitude at which they are located, their topographic location and the hydrographic basin in which they are located. In the latter case, the basins are organized through a system of basin and sub-basin, encoded in an identification system that allows control over the creation of the data and facilitates future data queries.

The content of the main table of engravings is complemented by other data related to their state of conservation, such as their general condition, apparent alterations and their exposure to any obvious conservation risk. It also provides ethnographic information with data such as if the place is Christianised and if it features any kind of legend or other oral tradition. Finally, information is provided on access and if the sites are part of

[1] http://www.dgterritorio.pt/cartografia_e_geodesia/cartografia/carta_administrativa_oficial_de_portugal__caop_/caop_em_vigor/

a tour or tourist route; In addition, the author of each site file is given and the institution to which they belong.

Next to the table **d_gravuras** (carvings) that contains all the information previously described, each of the sites has another series of information, which it is necessary to organize through secondary tables that allow the establishment of relations between them. This is the case of documentation of various types such as bibliography or images, where each of the sites can have more than one related document. In this way, we can join each of the sites with more than one bibliographic document. In the case of images, depending on the case we can find more than one photograph or drawing.

The drawings and photographs are in the table**d_image** (image). Each of the images is related to the site to which it belongs through an intermediate table that allows us to relate each of the sites with all their documents, through the codes of site and image identification. One of the purposes of the work consisted of the standardisation of all this documentation, so that through its codification, it was more easily dealt with at a later time. The structure of the table collects data, such as the original name of the image, a description and the author of the same. The application also has the functionality of making a copy of each image, renaming it using a common system applicable for all cases, and providing a code that describes the identifier of each site and a correlative number corresponding to the number of images. This coding system, besides giving the database a greater coherence, facilitates the realisation of files, and their publication through the web.

One of the initial requirements of the database establishes that it should facilitate the possibility of making queries about the stylistic grammar to which the engraving sites belong. Each of them can belong to one, or more stylistic groups, either to Atlantic rock art or to Schematic rock art. At the same time, each site may also have representations of a wide range of different motifs. For this reason it has become necessary to develop architecture that allows the storage of more than one stylistic group or motif for each of the engraving sites.

This is reflected in the table's **u_gra_estilo** (style) and **u_gra_motivo** (motif), where each site code is stored with the corresponding style or motif code, which is represented.

The recorded motifs described for each site are encoded in the table **cl_motivo** (cody list _motif). This coding is done in a hierarchical way, which allows the creation of three levels of description for each of the motifs. In the first level, the most general description of each of the motifs, for example circles, weapons, zoomorphs, etc., is collected. In each of the following sub-levels the description of each motif is more detailed. Here, aspects not represented at each higher level are specified. As an example, if we wanted to document an halberd, its identification code would be 08.01.The first two digits belong to the first level of description, which in this case corresponds to the group *Arma*s (Weapons), and the last two, to the specific case of halberds. This system allows us to make queries that answer specific questions, such as the distribution of sites where halberds are recorded. But with the same system, and taking into account only the first two digits of the code, we could run a query that represents the sites where any type of weapon appears.

The structure of the CVARN system allows the management and analysis of the stored information, so we can consider it as a tool to perform tasks on territorial management, or obtain results for scientific purposes.

The engravings are treated as spatial data, so we can map them and get information about their location and the relationships that are established between the different elements. In an abstraction of reality, each element is treated as a point with latitude and longitude coordinates, on which we can carry out studies on specific geographical areas, applying different parameters and conditions. At the same time, we can pose research hypotheses not related to spatial aspects, but to their attributes. For example, why instances of a type of engraving are located where they are, why they have the characteristics they have, or what has changed in a particular aspect such as their state of conservation.

3. CVARN as a social tool

Rock art has an identity, a social and economic value in so far as it preserves the memory and identity of a region, generates business opportunities and can be converted, through the development of projects of evaluation and dissemination, into a product of cultural tourism capable of generating development and contributing to the improvement of the population's quality of life.

Thus, the CVARN, in compiling, systematizing and making accessible the scientific knowledge about the rock art of the western façade of central and northern Portugal, is a social tool at the community's service and may become an instrument for the development of the territory.

This is an important step for the integration of this heritage into the management programs of the territory by the managing entities, namely districts, municipalities, parishes, local development associations and heritage defence associations, among others.

As examples, the CVARN enables searches by the number of engraved outcrops within a municipality or district (Fig. 2); searches by the official entity, which classified the sites; searches by the state of preservation of engraved outcrops cross-referenced against municipality, or district, etc.

Based on this collection of information and in order to test the functionality of the database, some groups or carving outcrops with tourist potential for the Minho, Lima, Cávado and Ave valleys have already been identified (taking into account their conservation conditions, diversity of motifs, lithological particularities of the rock surface, geoforms, accessibility and their surrounding landscape). This research has given rise to the projection of several tourist itineraries (Cardoso and Bettencourt, 2015[2], Sá, 2015[3]; Sá and Bettencourt, 2015[4]; Sampaio and Brochado, 2015[5]) within the project *Rota da Arte Rupestre do Noroeste. Um projeto de Turismo Cultural (Northwest Iberia Rock Art Route. A Cultural Tourism Project)*[6] (Bettencourt *et al.,* 2017a) and to the patrimonial and tourist evaluation of the Chão do Cano rock engravings, in the parish of

[2] Cardoso, D. and Bettencourt, A.M.S. "Na Rota de Arte Rupestre do Noroeste de Portugal": o concelho de Guimarães", poster presented to *CIT 2015. IV International Congress on Tourism*, ESG/IPCA, Guimarães, Portugal, 3rd-5th, December of 2015 (https://uminho.academia.edu/AnaBettencourt/Posters).

[3] Sá, S. *Turismo Arqueológico: um Projeto de Valorização da Arte Rupestre do Vale do Lima.* Braga: Universidade do Minho, 2015 (Master thesis).

[4] Sá, S. and Bettencourt, A.M.S. "Pensando uma Rota de Arte Rupestre para o Noroeste de Portugal: o vale do Lima", poster presented to *CIT 2015. IV International Congress on Tourism*, ESG/IPCA, Guimarães, Portugal, 3rd-5th, December of 2015 (https://uminho.academia.edu/AnaBettencourt/Posters).

[5] Sampaio, H. A. and Brochado, C. "Arte rupestre e turismo no concelho de Barcelos (Portugal): proposta de percursos temáticos no âmbito da Rota de Arte Rupestre do Noroeste", poster presented to *CIT 2015. IV International Congress on Tourism*, ESG/IPCA, Guimarães, Portugal, 3rd-5th, December of 2015 (https://uminho.academia.edu/HugoAluaiSampaio/Posters).

[6] Developed by Landscapes, Heritage and Territory Laboratory – Lab2PT, University of Minho, Portugal.

Âncora, municipality of Caminha, among other local actions and events to evaluate and promote this cultural heritage.

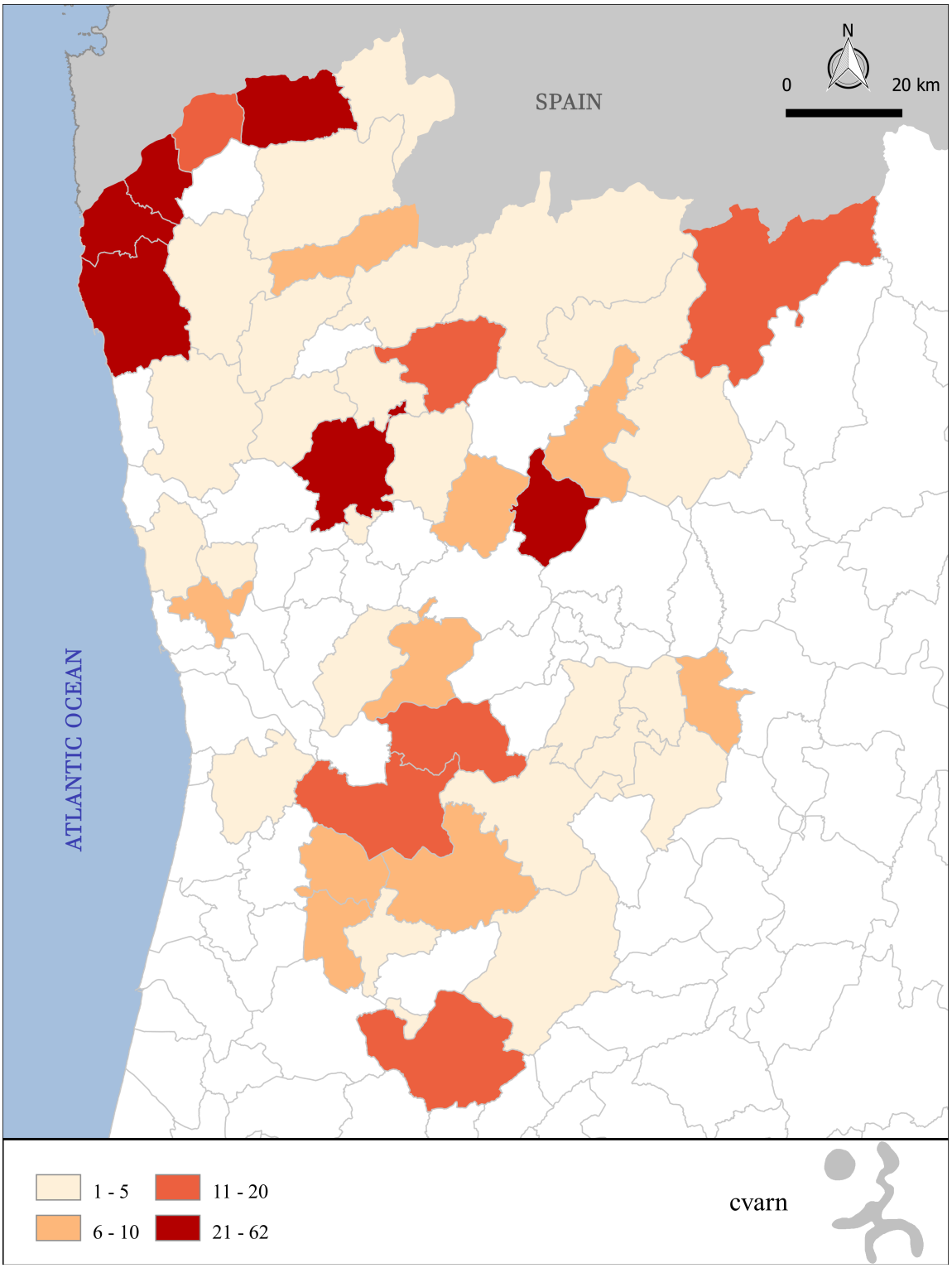

Fig. 2. Number of sites with engraved outcrops by municipality up to 2014.

In addition to actions and products for promotion, dissemination and evaluation, the CVARN also allows actions to protect rock art sites in case of several kinds of threat, because it allows a faster and more effective analysis of the areas, which might be affected by certain building or afforestation projects or natural phenomena.

4. CVARN as a scientific tool

As a scientific tool the CVARN also has many possibilities because it compiles and synthesizes accumulated knowledge and it will allow an updated literature review of North-western rock art, to understand spatial or density trends of the different styles and thematic patterns, and so on.

The available data indicates a considerable increase in the number of discovered open-air rock carvings in recent years, mainly because of this project and subsequent research. From a total of 408 engraved places (Fig. 3), 142 (35%) were discovered in the context of this project, mainly within the western areas.

It is necessary to say that this total corresponds to a number of engraved places but not to the actual number of carved rocks. For example, at the Gião complex, in the municipality of Arcos de Valdevez, there are more than 100 outcrops recorded (Fontes 1932a, 1932b; Baptista, 1980, 1981, 1983-1984); in Outeiro de Tripe I e II, at Chaves, there are 28 carving outcrops registered (Baptista, 1983-1984); at Chã da Rapada, in Ponte da Barca, there are 15 recorded (Alves, 2012); in the Fial I, II, II e IV, in Tondela, 59 are recorded with prehistoric chronology, and, at Meal da Dona, also in Tondela, 5 (Santos, 2008), etc. So, the number of rock engravings is more than the 651. It was necessary to exclude from the database the sites that are known from the bibliography but were not found during the archaeological survey work.

As this is the first census that has taken place only for the Northwest of Portugal, the progress of archaeological research will allow this number to be quickly increased. This has been particularly true since 2014, as more than 150-recorded outcrops have been found, although not yet updated within the database. For this purpose, a new project is expected be approved. So, we intend that this tool be permanently updated.

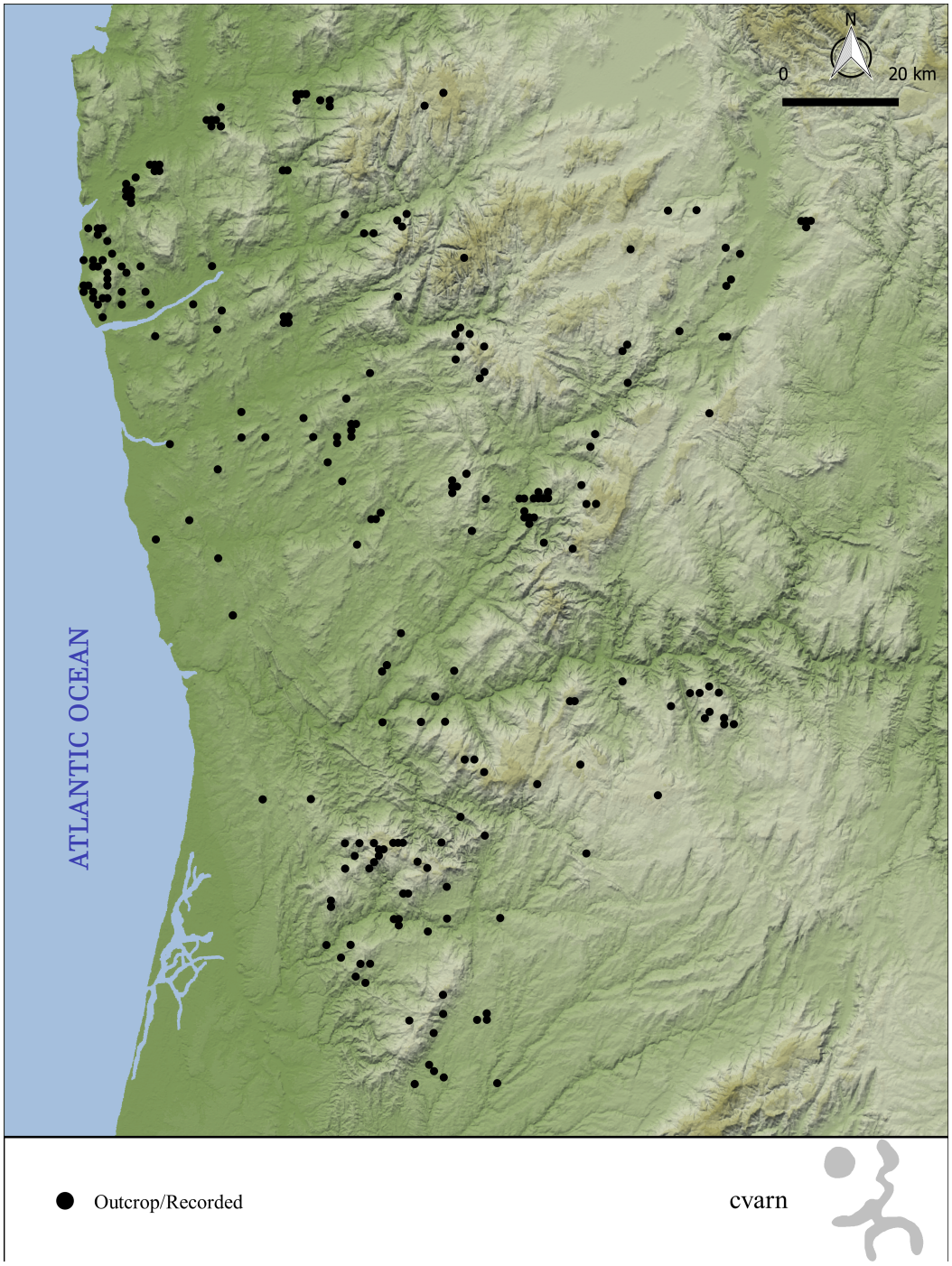

Fig.3. Map showing the distribution of outcrops and sets of outcrops recorded before 2014.

The 408 carved mapped places were classified taking into account the two stylistic groups known in the region Atlantic Rock Art and Schematic Rock Art, despite the subjectivity of this second group in relation to open air recorded sites, as has been mentioned by several authors (for example, Jorge, 1986; Alves and Reis, 2009, among

others). An Indeterminate category was also created, to include a number of carving outcrops with motifs distinct from the two stylistic groups defined.

The sites with Atlantic Art represent 40% of the total. The sets with schematic art correspond only to 11%, although the number of outcrops recorded, is clearly higher. There are also four sites (1%) that are considered as a syncretism phenomena between the Atlantic and Schematic arts. Thus it is verified that there are a large number of sites (48%) that were included in the group Indeterminate (Fig. 4). Within this, the majority are those that only represent cup-marks, sometimes joined with grooves (18%), followed by isolated podomorphs (4%) and grid patterns, isolated and distinct from those of the Schematic art (4%). Also in this category were included zoomorphic depictions (2%), not associated with the Atlantic Art motifs, weapons or tools isolated or associated with distinct iconographies of the two previously defined styles (2%), depictions of hands (1%) and game boards (1%). The remaining 16% include a great diversity of motifs that appear either isolated or in association with each other, and which also do not characterize the defined stylistic groups. These include idoliformes or steliforms, "palletes", boat shapes, snakes shapes, simple grooves, subnaturalistics anthropomorphic, rock-mills, natural sinks joined by grooves, etc.

This collection of data was the starting point for research projects of a monographic nature (Santos, 2014[7]; Bettencourt et al., 2017b) or of a wider spatial scope, at different scales (Cardoso, 2013a, 2013b, 2015[8], Cardoso and Bettencourt, 2015, Moreira, 2017[9]). It also allowed a new reflection on the rock art of the Portuguese Northwest (Bettencourt, 2017).

[7]Santos, A.C. *A Lage da Churra (Carreço, Viana do Castelo). Estudo monográfico de um lugar gravado,* Braga: University of Minho, 2014 (Master thesis).

[8]Cardoso, D. *Arte Atlântica do Monte de S. Romão (Guimarães) no Contexto da Arte Rupestre Pós-paleolítica da Bacia do Ave – Noroeste Português,* Vila Real: University of Trás-os-Montes e Alto Douro, 2015 (PhD thesis).

[9]Moreira, J. *Podomorfos na fachada ocidental do Noroeste de Portugal*, Braga: Universidade do Minho, 2014 (Master thesis).

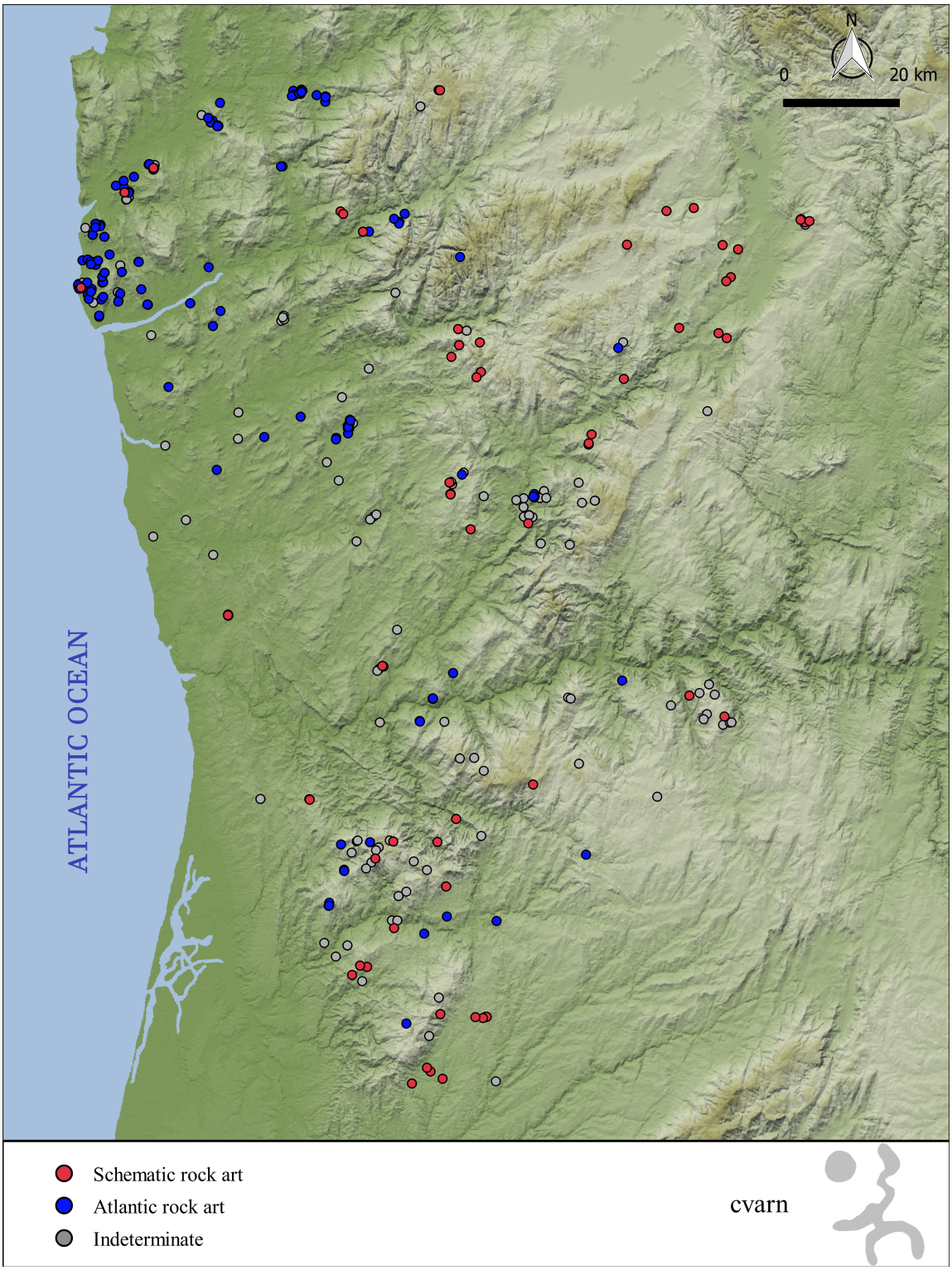

Fig. 4. Spatial distribution map of outcrops and sets of outcrops recorded with Atlantic and Schematic rock art and the so-called Indeterminate category, until 2014

5. Final considerations

The Northwest Rock Art Corpus - CVARN, which underlies this work, demonstrates its usefulness in social and scientific terms.

Its exploitation has already served to prepare a project aimed at protecting and enhancing rock art as a cultural heritage, as well as the projection of various itineraries for heritage and cultural tourism, although many other possibilities can still be explored.

In scientific terms it has already facilitated and continues to facilitate the development of projects in this field, which allows us to increase the knowledge of rock art in the North of Portugal; to bring to the discussion new proposals on northwest art; and to create scientifically validated arguments for the integration of some rock art sites, into projects concerning the touristic evaluation of cultural heritage.

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